10. Nishi

Program Name: Nishi.java   Input File: nishi.dat

Nishi has just learned all about significant digits in chemistry class. Significant digits are a way to indicate certainty of measurement when reporting the results of various calculations. Significant digits are defined by the following rules (significant digits for the examples are shown in parenthesis):

- All non-zero digits are significant: 1, 2, 3, 4, 5, 6, 7, 8, 9.
- Zeros between non-zero digits are significant: 102 (3), 2005 (4), 50009 (5).
- Leading zeros are never significant: 0.02 (1), 0.000515 (3).
- In a number with a decimal point, trailing zeros (those to the right of the last non-zero digit) are significant: 2.02000 (6), 5.400 (4), 57.5400 (6).
- In a number without a decimal point, trailing zeros may or may not be significant. To keep things simple, Nishi's teacher has told them to assume they are NOT significant.

When multiplying and dividing, results should have as many significant figures as the number with the least number of significant digits. For example, $1.234 \times 2.0 = 2.468$. However, since 2.0 only has two significant digits, the answer should be reported as 2.5.

To round properly to the correct number of significant figures, ONLY consider the digit to the right of the last significant digit. For example, 5.349 rounded to two significant figures would be 5.3. The digit 9 is not considered in the rounding process. If the digit considered for rounding is 5, round towards positive infinity.

While Nishi is to consider trailing zeroes in numbers with no decimal place in the problems as not significant this can't be the case for numbers in the results. To remove any doubt about the number of significant digits in results that turn out to be whole numbers with trailing zeroes Nishi is going to display all of the results using scientific notation. For example 18000 with three significant digits should be printed as 1.80E4. That is the equivalent of 1.80×10^4. If a result has just one significant digit, do not display a decimal point. For example, 19825 with one significant digit would be 2E4.

Nishi's homework is a worksheet with a variety of multiplication and division problems for her to do where the answers are to be rounded to the correct number of significant digits. Nishi has wisely enrolled in a computer science class as well as chemistry this school year so she is going to code up a program that will do the calculations in the worksheet and report the answers in the correct form for her. What might that program look like?

Input: A number N on the first line that represents the number of problems on the worksheet. N lines where each line is a problem in the form A X B or A / B where X stands for multiplication and / stands for division. A and B will both be greater than -100,000 and less than 100,000. There will be exactly one space between the operands and the operator.

Output: The product or quotient for each problem, each on a separate line. Each value should be displayed using scientific notation and with the proper number of significant digits.

Sample input:	Sample output:
4 3.566 X 1.5 30.0 X 8.973 140 / 19.2654 1500.0600 X 35000.00005	5.3E0 2.69E2 7.3E0 5.2502100E7